2002 GUIDELINES FOR COST EFFECTIVE ENERGY MANAGEMENT IMPROVEMENT PROJECTS

For use with Building Energy Management Programs Financing beginning July 1, 2001

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This material was prepared with the support of the U.S. Department of Energy (DOE). However, any opinions, findings, conclusions or recommendations expressed herein are those of the authors and do not necessarily reflect the views of the DOE.

INTRODUCTION

The goal of the Iowa Building Energy Management (BEM) Programs is to reduce energy costs for taxpayer supported facilities. The Programs provide access to the financing needed to identify and implement technically viable, cost-effective Energy Management Improvements (EMI). The Programs have established agreements with private sector legal and financial resources that make the necessary funds available to BEM clients including schools, local governments, hospitals, private colleges and state facilities.

Previously, Iowa law and policy directed that analyses be comprehensive and that the package of EMIs proposed for Program financing have an aggregate six-year payback. However, Iowa Code Section 473.20, subsection 1, has recently been amended (with strike through of original text shown) to read as follows:

1. The department may make loans to the state, state agencies, political subdivisions of the state, school districts, area education agencies, community colleges, and nonprofit organizations for implementation of energy conservation measures identified in a comprehensive engineering analysis. Loans shall ~~not be made for energy conservation measures that require more than an average of six years for the state, state agency, political subdivision of the state, school district, area education agency, community college, or nonprofit organization as an entity to recoup the actual or projected cost of construction and acquisition of the improvements; and cost of the engineering plans and specifications~~ be made for all cost effective energy management improvements. For the state, state agencies, political subdivisions of the state, school districts, area education agencies, community colleges, and nonprofit organizations to receive a loan from the fund, the department shall require completion of an energy management plan including an energy audit and a comprehensive engineering analysis. The department shall approve loans made under this section.

Therefore, effective July 1, 2001 BEM Programs will be able to provide financing for all cost-effective energy projects in public facilities (not just those within the aggregate six-year payback). It is the goal of this guideline document to define cost effective in a way that is accurate, simple to derive, easily understood, and minimizes administrative costs.

COST EFFECTIVE

Cost effective is defined as the ability to recoup the actual or projected cost of construction and acquisition of the improvement, and cost of the engineering plans and specifications within the useful life of the improvement, or incremental cost of the lowest life cycle cost design alternative.

The means of determining which projects are cost effective for approval of BEM financing as explained below.

AGGREGATE IMPLEMENTATION PACKAGE

An aggregate payback package of EMIs is the total installation costs (including design, etc.) of all EMIs to be installed divided by the total of the annual savings. This enables short payback projects to be combined with longer payback projects that may not otherwise be implemented. This is one of the benefits of the comprehensive BEM program offering.

FINAL BEM FINANCING PACKAGE

Prior to the completion of the Technical Engineering Analysis (TEA) or Energy Audit (EA) report, the analyst or auditor is required to put EMI projects in a logical order of implementation priority so that the final report savings totals account for EMI interaction. (Refer to the current Technical Engineering Analysis Guidelines or Energy Audit Guidelines). From the final report, the analyst is able to determine, with input from the client, the complete package of projects to recommend for financing. **The maximum available term for BEM financing is 12 years. Clients will be required to implement, at a minimum, all improvements that fall within a 3 year simple payback period.**

Refer to the current version of the Department's Technical Engineering Analysis Guidelines or Energy Audit Guidelines for further discussion of BEM requirements for the financing package, as well as technical and documentation requirements of the BEM programs.

The *List of EMI Savings and Costs* form (copied from the TEA Guidelines) is provided below as a sample of some of the documentation requirements of the BEM programs. EMIs are to be listed on the form in order of recommended implementation. Additional documentation is required for incremental financing based on life cycle cost.

In addition, the following *Energy Management Plan* (copied from the TEA and EA Guidelines) is required for each study or studies conducted under the TEA or EA contract. The analyst works with the client to develop the *Energy Management Plan* (EMP) during the facility analysis, however, the EMP often encompasses the results of several reports (such as when the analysis contract covers several buildings). The EMP is the document representing the end product of the analysis contract and serves as a plan of action for the client. If necessary, the analyst is to provide narrative text explaining the contents of the EMP and summarize the contents of the EMP form. For each EMI, this form records the analyst's implementation recommendation, implementation order, and implementation schedule. This information is recorded on the EMP and is submitted with the report(s) to the Department.

List of EMI Savings and Costs

Institution _____ Building _____

Remaining useful life of building ____ years

EMI #	Page	Project Title	Electricity Savings		Demand Savings		Natural Gas Savings		Non-Energy Savings
			kWh/yr	$/yr	kW	$/yr	CCF/yr	$/yr	$/yr

EMI #	EMI Type	EMI Material Cost	EMI Labor Cost	EMI Design Cost	Manage-ment Fee *	Initial Capital Outlay	EMI Rebate	Net EMI Cost	Savings ($/yr)	Simple Payback (years)	Aggregate SPB (years)	EMI Useful Life

- Management fee includes energy services company (ESCO) or performance contract overhead and profit charges, and/or construction management costs, as applicable.

Energy Management Plan

Institution _____ Number (if any) _____ Page ____ of ____

Building #	EMI #	EMI Code	EMI Title	Electricity Savings (kWh)	Natural Gas Savings (Therms)	Annual Cost Savings ($/yr)	EMI Cost	Simple Payback (years)	Aggre-gate SPB (years)	EMI Useful Life (years)	Rec. Y or N	Implemen-tation Date	Method of Financing
Totals													

EMI Codes and Useful Lives

Useful Life in Yrs.		
Building Envelope		
	Insulation	
25	BRR	Roof/Ceiling insulation
25	BRW	Wall insulation
25	BRC	Combination roof/ceiling and wall insulation
25	BRO	Other insulation measures
	Infiltration Control	
10	BIZ	Infiltration control
	Fenestration/Windows	
25	BFS	Storm windows
25	BFD	Double glazing
25	BFT	Triple glazing
25	BFI	Replace glass with insulated panels
15	BFF	Reflective film
25	BFW	Wall up or close off
15	BFX	Other window measures
	Other Openings (e.g. doors, loading docks, etc.)	
25	B0S	Storm doors
25	BOA	Air locks or vestibules
25	BOW	Wall up or close off openings
25	BOX	Other door/miscellaneous measures
Renewable		
	Solar	
10	RSW	Solar hot water
10	RSA	Active solar space conditioning
20	RSP	Passive solar space conditioning
10	RSV	Photovoltaic application
	Wind, Hydro	
20	RBZ	Use of wind energy
10	RGZ	Use of water power
	Renewable Conversions	
25	RCB	Conversion to biomass
20	RCG	Geothermal heat pump
25	RCM	Conversion to methane
25	RCR	Conversion to refuse
25	RCW	Conversion to wood
25	RCX	Conversion to other renewable

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Useful Life in Yrs.		
Mechanical Systems		
	Non-Renewable Conversions	
25	MCC	Conversion to coal
25	MCE	Conversion to electricity
25	MCG	Conversion to natural gas
25	MCO	Conversion to oil
25	MCX	Conversion to another non-renewable fuel
	Controls	
10	MKC	Central control/automated energy management
10	MKE	Enthalpy control
10	MKS	Shut down/shut off devices
10	MKT	Temperature reset devices
10	MKX	Other control devices
	Air-Conditioning	
25	MAC	Chiller conversion/efficiency improvement
15	MAE	Install economizer
25	MAU	Package unit application
15	MAX	Other air-conditioning measure
	Domestic Water	
10	MWC	Reduce circulation pump operation
15	MWD	Decentralized hot water heater
20	MWF	Install flow restrictors
20	MWI	Insulate tanks
15	MWX	Other water measure
	Other	
10	MOE	Install energy recovery devices
20	MOG	Cogeneration application
	Heating Modifications	
10	MHA	Install automatic ignition device
25	MHB	Replace burner
25	MHD	Downsize system
15	MHE	Install stack economizer
10	MHF	Install automatic flue damper
10	MHH	Install humidification device
25	MHO	Replace boiler
20	MHP	Preheat combustion air/make up water
15	MHT	Install turbulators
10	MHX	Other heating modification

Useful Life in Yrs.		
Mechanical Systems (continued)		
	Air Distribution System Modifications	
15	MDA	Reduce air volume
20	MDI	Insulate pipes or ductwork
10	MDO	Install automatic dampers
15	MDS	Prevent air stratification
15	MDT	Repair/replace steam traps
15	MDV	Install variable air volume system
20	**MDR**	**HVAC retrofit or replacement**
10	MDX	Other distribution system modification
10	MDZ	Zoning modifications
	Swimming Pools	
10	MPC	Install swimming pool cover
15	MPD	Pool dehumidification
15	MPR	Pool heat recovery
Electrical/Lighting		
	Lighting Conversions	
20	ECE	Convert to T8s and electronic ballasts
20	ECF	Convert to fluorescent lights
20	ECH	Convert to high intensity discharge (HID) lamps
25	ECL	Convert exit light fixtures to LED exit fixtures
10	ECW	Install reduced wattage fluorescent lamps
8	ECX	Convert to other high efficiency lamps
	Lighting Modifications	
20	EMB	Install energy efficient ballasts
20	EMD	Disconnect ballasts
8	EMF	Modify fixture (e.g. reflectors, lower height, etc.)
20	EMR	Reduce number of fixtures/task lighting
10	EMZ	Other lighting modification
	Controls	
10	EKD	Install demand limiter controls
10	EKZ	Electrical system control devices
	Motors	
20	MME	Install energy efficient motors
20	MMS	Down size motors
20	MMV	Install VFDs
20	MMX	Other motor modification
	Other Electrical	
10	EEZ	Other electrical applications